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Bias-Dependent Noise Measurements in Individual Electromigrated Nanoscale Junctions PATRICK WHEELER, RUOYU CHEN, DOUGLAS NATELSON, Department of Physics Rice University — Shot noise provides insight into the correlated motion of electrons in nanostructures. Previous measurements have examined shot noise in mechanically controlled break junctions (MCBJs),looking at a large ensemble of junction configurations at room temperature. Electromigrated, lithographically created Au structures at liquid nitrogen and helium temperatures allow for noise measurements of individual junction configurations. High frequency excess noise is amplified by a RF amplifier chain and measured in combination with lock-in techniques simultaneously with the dc conductance. Noise measurements across bias and temperature are compared to previous experiments preformed with MCBJs at room temperature, with an emphasis on the dependence of the noise on bias conditions. We find that measured noise in individual junctions can exhibit nonlinearities with bias as well as asymmetries as a function of the polarity of bias current. Individual junctions can also switch stochastically between different atomic configurations with nearly identical conductances but strikingly different noise properties. We discuss these observations in the context of "traditional" shot noise, bias-dependent noise processes, and 1/f contributions to the measured noise.

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